Chapter 5
WATER QUALITY STANDARDS AND CONTROL MEASURES FOR THE LAKE TAHOE BASIN

Introduction

Lake Tahoe is a designated Outstanding National Resource Water[1] (ONRW), which is renowned for its extraordinary clarity and purity, and deep blue color. Since the 1960s, Lake Tahoe has become impaired by declining transparency and increasing phytoplankton productivity due to increased sediment and nutrient loading attributable to human activities (Figures 5-1 and 5-2). Further increases in algal growth could change the clear blue color of the Lake. Under federal and state antidegradation regulations and guidelines, no further degradation of Lake Tahoe can be permitted. Attainment of clarity and productivity standards requires control of nutrient and sediment loading, which in turn requires (1) export of domestic wastewater and solid waste from the Lake Tahoe watershed, (2) restrictions on new development and land disturbance, and (3) remediation of a variety of point and nonpoint source problems related to past human activities in the Tahoe Basin. **This Chapter summarizes a variety of control measures for the protection and enhancement of Lake Tahoe which in many cases are more stringent than those applicable elsewhere in the Lahontan Region.**

Control of environmental problems at Lake Tahoe was initially difficult because the Lake is partly in California and partly in Nevada. The State Water Resources Control Board (State Board) adopted a special *Lake Tahoe Basin Water Quality Plan* in 1980 for the California side of the watershed. In recognition of the national importance of environmental protection at Lake Tahoe, a bistate Tahoe Regional Planning Agency (TRPA) was formed by act of Congress (P.L. 96-551). The TRPA was directed to adopt a regional land use plan based on "environmental threshold carrying capacities," to preserve a variety of environmental values in addition to water quality, including air quality, vegetation, wildlife and fisheries, and scenic quality. TRPA adopted regional environmental threshold standards in 1982. Its *Regional Plan for the Lake Tahoe Basin* (TRPA 1987), which includes Goals and Policies, a Code of Ordinances, and Plan Area Statements, received final approval in 1987. TRPA was also designated by California, Nevada, and the USEPA as the areawide water quality planning agency under Section 208 of the federal Clean Water Act. It adopted a bistate plan, currently entitled *Water Quality Management Plan for the Lake Tahoe Region* (TRPA 1988), which is referred to as the "208 Plan" throughout this Chapter. As part of its 1989 conditional certification of TRPA's 1988 revision to the 208 Plan (Resolution 89-32), the State Board directed the Lahontan Regional Board to incorporate the most appropriate provisions of the 208 Plan and the *Lake Tahoe Basin Water Quality Plan* into the *Water Quality Control Plan for the North Lahontan Basin.* This Chapter of the Lahontan Basin Plan fulfills that direction.

Most of the changes in this Chapter in relation to earlier water quality plans are editorial. Since the two Lake Tahoe water quality plans together comprise more than 1700 pages, the information which follows has been greatly condensed. Some plan language has been carried over verbatim. Some language has been edited for consistency with the rest of this Basin Plan (e.g., with respect to capitalization and acronyms). The reader is referred to the original plans for more detailed discussions and background information on water quality problems, the history of planning at Lake Tahoe, implementing agencies and schedules for implementation, and the rationale for specific control measures.

More substantial changes in this Chapter in relation to earlier water quality plans include: new beneficial use designations, revised narrative water quality objectives, new numerical water quality objectives for Fallen Leaf Lake, incorporation of provisions of the USEPA's National Toxics Rule, update of some language to reflect current state laws, and some changes in control measures to resolve differences between the State Board and TRPA plans.

Note: [1]ONRWs are described in Chapter 4. See the subsection entitled "Special Designations to Protect Water Resources" within Section 4.9, "Resources Management and Restoration."

For the reader's convenience, this Chapter contains copies of some information on water quality objectives, beneficial use designations, and waste discharge prohibitions for waters of the Lake Tahoe Basin which is also included in Chapters 2, 3, and 4 of this Basin Plan.

Water Quality Problems and Control Needs

Steep slopes, erodible soils, and a short growing season make the Lake Tahoe Basin acutely sensitive to human activities. Development practices which may have little impact elsewhere can cause severe erosion in the Tahoe Basin, increasing sediment and nutrient loads to Lake Tahoe. Relatively small nutrient loadings can seriously affect Lake Tahoe's water quality. The level of algal growth in the lake is limited by the availability of nutrients; the concentration of nutrients in the lake at present is extremely low. The primary source of additional nutrients is erosion resulting from land development and land management practices. Lake Tahoe has historically been considered nitrogen limited; recent bioassays indicate that phosphorus is also becoming limiting in some situations. It is important to control **all** controllable sources of both nitrogen and phosphorus. Development disturbs vegetation and soils, and creates impervious surface coverage which interferes with natural nutrient removal mechanisms. Other sources of nutrients include fertilizers, sewer exfiltration and sewage spills, leachate from abandoned septic systems, and atmospheric deposition.

Erosion and surface runoff related to rapid development of the Lake Tahoe Basin in the 1960s and 1970s caused deterioration of the water quality of Lake Tahoe. Phytoplankton productivity in Lake Tahoe increased more than 200 percent, and water clarity decreased by 22 percent, between 1968 and 1991. (Water quality standards for clarity and productivity are based on 1968-1971 levels.) Increased growth of attached algae in nearshore waters has been linked to the level of onshore development.

Because of its large size compared to its small watershed, Lake Tahoe has a very long residence time. The typical drop of water resides in Lake Tahoe for about 700 years. Thus, the flushing action of precipitation and runoff that benefits many other lakes cannot be relied upon to preserve Lake Tahoe. For practical purposes, one may employ the approximation that sediments and nutrients discharged to Lake Tahoe remain there forever, either suspended in the water column, or settled on the bottom.

Although recent changes in the water quality of Lake Tahoe are drastic, they do not reflect the *full* impact of the increases in erosion rates caused by recent development. There is a long lag time between disturbances in the Basin and the complete expression of their impacts on Lake Tahoe. Increased nutrient loading rates exert their full effect through a gradual buildup of nutrient concentrations over many years. Thus, preventing future increases in erosion rates will not be enough to protect the water quality of Lake Tahoe. A major reduction in the quantities of nutrients reaching Lake Tahoe is required.

Although the primary purpose of the implementation program in this Chapter is to protect and enhance the water quality and beneficial uses of Lake Tahoe, it will also protect tributary waters. There are 170 other lakes, 63 tributary streams, and numerous wetlands in the Lake Tahoe Basin; most of the lakes and about half of the streams are in California. There are also two named ground water basins in the California portion of the watershed. Most of these waters have naturally high quality, and state and federal antidegradation regulations apply. The Upper Truckee River, and the lower Truckee River downstream of the Lake Tahoe dam are under study for inclusion in the National Wild and Scenic Rivers System. Although many of the lakes are within wilderness areas, they are threatened by heavy recreational use and atmospheric deposition. Other tributary waters have been adversely affected by erosion, stormwater, diversion, channelization, or filling. In particular, wetlands have been drastically disturbed by human activities; see the section on Stream Environment Zones (SEZs) below.

The water quality control program for the Lake Tahoe Basin treats erosion and surface runoff (stormwater) as different facets of the same problem. Reducing nutrient loads will require both remedial measures to correct existing erosion/runoff problems and strict

controls on future development. The principal control measures are:

- Large-scale remedial erosion and drainage control (Capital Improvements Program) and SEZ restoration projects.

- Installation and maintenance of onsite erosion and surface runoff (stormwater) control measures in connection with all new and existing development.

- Controls on nonpoint source discharges from new development, including new subdivisions, new development in SEZs, new development with excess impervious surface coverage, and new development not offset by remedial measures.

- Controls on discharges related to other activities including timber harvest, livestock confinement and grazing, and recreational facilities (including golf courses, dredging, and shorezone construction to support water-related recreational activities).

In addition to the control measures for sediment and nutrients which were the main focus of the two earlier Lake Tahoe plans, regionwide control measures for toxic pollutants, needed for attainment of the water quality objectives in the USEPA's National Toxics Rule, section 131.36 of 40 CFR (10/22/92), which is incorporated by reference, apply to the Lake Tahoe Basin. Because the Lake Tahoe program emphasizes the use of wetlands (SEZs) for stormwater treatment, the attainment of objectives for toxic metals and whole effluent toxicity in waters affected by stormwater discharges must be given special consideration. Control measures to ensure attainment of the objective for nondegradation of biological communities and populations are also of concern in relation to stormwater discharges.

Implementation Authority

Implementation of the water quality control programs discussed in this Chapter is a bistate, interagency effort. These control measures, and the authority for their implementation, are summarized in Table 5-1. Many of the control measures can best be implemented by local governments or the Tahoe Regional Planning Agency, but the Lahontan Regional Board and State Water Resources Control Board are ultimately responsible for implementation. To the extent that other agencies do not make and fulfill implementation commitments, the Regional Board will carry out these control measures. Similar control measures are being implemented by TRPA and the Nevada Division of Environmental Protection in Nevada.

The Lahontan Regional Board's authority for planning, regulation, and enforcement is discussed in greater detail in Chapters 1 and 4 of this Basin Plan. The Regional Board implements the federal Clean Water Act, the California Water Code (including the Porter-Cologne Act) and a variety of laws related to control of solid waste and toxic and hazardous wastes. The Regional Board has authority to set and revise water quality standards and discharge prohibitions. It may issue permits, including federal NPDES permits and Section 401 water quality certifications, and State waste discharge requirements or waivers of waste discharge requirements. Its planning and permitting actions require compliance with the California Environmental Quality Act (CEQA). The Regional Board has broad enforcement authority; actions may range from staff enforcement letters, through cleanup and abatement or cease and desist orders, to civil penalties or referral to the California Attorney General.

The State Board has authority to review Regional Board planning and permitting actions. It sets statewide water quality policy. It may also adopt water quality standards and control measures on its own initiative, as it did in the *Lake Tahoe Basin Water Quality Plan*. Other State Board functions which may affect the Lake Tahoe Basin include loan and grant funding for wastewater treatment facilities and nonpoint source control projects, and water rights permitting authority.

The Tahoe Regional Planning Agency's authority comes from P.L. 96-551 and from the water quality planning functions delegated by California, Nevada, and the USEPA under Section 208 of the Clean Water Act. TRPA has a bistate Governing Body with appointed members, an Advisory Planning Commission which includes the Executive Officer of the Lahontan Regional Board, and a technical staff under an Executive Director. It may set regional environmental standards, issue land use permits including conditions to protect water quality, and take

enforcement actions. TRPA is directed to ensure attainment of the most stringent state or federal standards for a variety of environmental parameters in addition to water quality; for example, it is a designated air quality and transportation planning agency in California. TRPA has delegated authority to review certain types of new development to local governments under Memoranda of Understanding (MOUs). P.L. 96-551 establishes a TRPA environmental review process which is legally separate from CEQA and from the National Environmental Policy Act (NEPA). TRPA's Code of Ordinances, and its MOUs with federal, state and local governments identify categories of projects and activities which are exempt from TRPA's review. Further direction for TRPA's activities is included in a 1987 settlement of litigation by the California Attorney General and the League to Save Lake Tahoe against TRPA over the adequacy of its regional land use plan.

TRPA's approach to water quality control involves a combination of voluntary and regulatory aspects. As noted in the section on Best Management Practices (BMPs), below, TRPA sets conditions for protection and enhancement of water quality in its land use permits for new projects or projects involving remodeling, and relies initially on voluntary BMP implementation by landowners who are not seeking permits. All landowners are expected to implement BMPs over the 20-year lifetime of the 208 Plan. Local governments have incentives for voluntary implementation of remedial water quality control projects in that TRPA may limit allocations for new development based on accomplishment of remedial work. If TRPA identifies significant water quality problems, it may request or require remedial action plans, including implementation schedules. TRPA's enforcement authority is narrower than the Lahontan Regional Board's. Noncompliance with permit conditions may result in forfeiture of required security funds, or revocation of the permit. However, TRPA cannot levy fines for noncompliance with permit or action plan conditions without going to court. The 208 Plan expresses TRPA's reliance on Regional Board authority to accomplish its water quality-related goals in California.

The Regional Board and TRPA implement their water quality plans in a complementary manner. The two agencies entered into a Memorandum of Understanding in 1994 in order to increase the level of coordination and the avoidance of duplication of effort. (See Chapter 6 of this Basin Plan for more information.)

The U.S. Forest Service (USFS), Lake Tahoe Basin Management Unit (LTBMU), controls over 70 percent of the land in the Lake Tahoe Basin. It implements a land and resource management plan (USFS 1988) and the statewide USFS 208 Plan (USFS 1979). In contrast to some National Forest plans which emphasize resource extraction activities such as timber harvest, the major emphasis of the LTBMU plan is water quality protection. The LTBMU has an ongoing watershed restoration program, and implements a land acquisition program to prevent development of sensitive private lands. It has permitting and enforcement authority over activities by other parties on National Forest lands. USFS activities and permits are subject to environmental review under NEPA. The Lahontan Regional Board reviews but does not issue permits for timber harvest activities by the LTBMU in the Tahoe Basin, under the statewide Management Agency Agreement summarized in Chapter 6. It may issue permits for other activities on National Forest land (e.g., ski area expansion).

Local governments in the Lake Tahoe Basin have been delegated authority by TRPA to implement its plans for certain types of development projects. They also have major responsibility for implementing the remedial projects for water quality problems which are discussed later in this Chapter. Local governments are preparing “community plans” in cooperation with TRPA, the business community, and other community interest groups, for most of the urban areas in the Tahoe Basin. These plans are expected to coordinate the accomplishment of remedial projects with new commercial development and redevelopment.

Other agencies involved in implementation of water quality control measures in the California portion of the Tahoe Basin include the U.S. Soil Conservation Service, the U.S. Army Corps of Engineers, the California Department of Transportation (Caltrans), the California Tahoe Conservancy, the California State Lands Commission, the California Department of Parks and Recreation, the California Department of Fish and Game, the California Department of Forestry and Fire Protection, and the Tahoe Resource Conservation District. Monitoring carried

out by the LTBMU, the U.S. Geological Survey, the University of California Tahoe Research Group, the California Department of Water Resources, and other agencies continues to be important in assessing progress on implementation. The 208 Plan (Vol. I) provides a more detailed discussion of water quality implementation authority in the Tahoe Basin.

Jurisdictional Boundaries

The California water quality standards and discharge prohibitions, and most of the control measures discussed later in this Chapter apply to the "Lake Tahoe Basin" or "Lake Tahoe Hydrologic Unit (HU)," which is the entire watershed tributary to and including Lake Tahoe in California. This area (Figure 5-3) includes portions of Alpine, El Dorado, and Placer Counties. The 208 Plan applies to the "Lake Tahoe Region," which is defined by P.L. 96-551. The Lake Tahoe Region includes lands in El Dorado and Placer Counties (California) and Douglas, Carson City, and Washoe Counties (Nevada) which are tributary to Lake Tahoe. It does not include the Alpine County portion of the Lake Tahoe watershed, but does include part of the Truckee River HU, between the Lake Tahoe outlet dam and the Bear Creek confluence (Figure 5-4). These differences in State and TRPA jurisdictional boundaries may create some confusion in implementation.

The Alpine County portion of the watershed is almost all National Forest land, but includes some State highway right-of-way and part of the South Tahoe Public Utility District (STPUD) wastewater export pipeline. The Regional Board has reviewed fisheries management activities, grazing permits, and proposed watershed restoration activities in this portion of the Tahoe Basin. It is a popular recreation area which includes a segment of the Pacific Crest Trail. All of the control measures discussed below for construction and other activities on National Forest lands, or for road and right-of-way construction and maintenance, apply in this area, even though TRPA permits may not apply. The Regional Board will consider issuing or revising waste discharge permits for activities in this area as necessary to protect water quality.

In the portion of the Truckee River watershed which is within TRPA's jurisdiction, the Lahontan Regional Board implements a separate set of water quality standards, discharge prohibitions, and exemption criteria. This area includes existing residential, commercial, and highway development. Proposals for its redevelopment have been made by Placer County under California redevelopment law, and through the joint Placer County/TRPA community planning process.

Compliance Schedules

Regionwide schedules for obtaining compliance with water quality objectives are discussed in Chapter 4 of this Basin Plan. The regional Water Quality Assessment database (described in Chapter 7) is revised periodically to reflect the current status of compliance with objectives and the current degree of support of beneficial uses. The USEPA requires reporting every two years under Section 305(b) of the Clean Water Act on whether a specific water body fully supports, partially supports, or does not support all designated beneficial uses. The Regional Board reviews the adequacy of all Basin Plan standards and control programs to protect water quality at least once every three years through the "Triennial Review" process, and sets priorities for further Basin Plan revisions accordingly (see Chapter 1).

Lake Tahoe is listed as a "Water Quality Limited Segment" under Section 303(d) of the federal Clean Water Act. When better information becomes available on sediment and nutrient budgets for Lake Tahoe, and on the efficiency of Best Management Practices, the Regional Board will use this information, and estimates of expected water quality improvements due to the control measures outlined in this Chapter, to establish Total Maximum Daily Loads (TMDLs) of pollutants to Lake Tahoe. Section 303(d) requires TMDLs to be set for Water Quality Limited Segments in order to ensure the attainment of surface water quality standards. A TMDL must be adopted as a Basin Plan amendment, and must be approved by the USEPA. (See Chapter 4 for additional information on TMDLs).

The water quality control programs for the Lake Tahoe Basin which are outlined below (including major remedial erosion/stormwater control and SEZ restoration programs) are expected to be implemented over a 20-year period ending in 2007. Implementation will involve coordinated actions by state, federal, regional, and local agencies, and by

private landowners. TRPA projects attainment of all water quality standards for Lake Tahoe and its tributaries by that date. In coordination with regional environmental monitoring programs, the TRPA Regional Plan and 208 Plan (Vol. I, pages 179-186) include a tracking system for measuring attainment of environmental standards. It identifies “benchmarks” or indicators of progress, narrative or numerical interim performance targets for state and regional standards which are not being attained, and a variety of in-place and potential supplemental “compliance measures” for attainment of these targets.

TRPA is required to identify, for each water quality control measure, the size and rate of its contribution to attainment of the threshold or standard, and to ensure that the control measures are adequate to attain and maintain the threshold standards. Based on results of scientific studies, TRPA may also adjust the targets to make them consistent with the latest scientific information.

The 1988 208 Plan incorporates TRPA's interim targets for turbidity in the shallow waters of Lake Tahoe, winter clarity in pelagic Lake Tahoe, phytoplankton productivity in pelagic Lake Tahoe, tributary water quality (including suspended sediment), runoff water quality (for discharges to surface waters and ground waters), water quality of “other lakes” than Lake Tahoe, acreage of naturally functioning Stream Environment Zones, vehicle miles travelled (as a means of reducing atmospheric deposition), reductions in atmospheric nutrient loading, implementation of the Capital Improvements Program, and implementation of Best Management Practices.

At five-year intervals, beginning in 1991, TRPA is required to issue progress reports covering: (1) the amount and rate of progress toward the targets above, (2) the cumulative impacts on each indicator of projects approved by TRPA from the date of approval of the 208 Plan, (3) the extent to which the Tahoe Region and applicable sub-regions are making progress toward the thresholds and standards for the parameters listed above, and (4) recommendations for implementation of supplemental or contingency measures necessary to attain and maintain the targets and standards, or (5) recommendations for modification or elimination of compliance measures in place to attain and maintain the targets and standards. Lists of supplemental compliance measures were included in the Technical Appendices (Vol. VII) of the 208 Plan.

If an interim target is not attained, adjustments must be made to TRPA's regional land use plan to ensure progress toward attainment; this may involve implementation of previously identified “supplemental” compliance measures. TRPA conducted its first five-year review of standards attainment in 1991-92, and adopted, or is in the process of adopting, changes to its Code of Ordinances affecting implementation programs. Interim targets for a number of the parameters listed above were also revised, without changes in the 208 Plan. (Substantial changes in compliance schedules or compliance measures could require amendments to the 208 Plan.) For example, TRPA's 1991 interim target for Stream Environment Zone (SEZ) restoration was 400 acres; actual restoration was about 100 acres. TRPA is revising SEZ restoration goals for each local government, to be implemented by the next (1996) major review of progress toward attainment of standards.

The 1988 208 Plan also includes a number of internal deadlines for implementation of specific tasks, not all of which have been met. In its 1989 conditional certification of the 208 Plan (Resolution 89-32; see Appendix B), the State Board set additional deadlines for a number of actions by TRPA, including preparation of a financial plan for implementation of key programs, and reports on water quality monitoring data and progress toward plan implementation.

Plan Amendment Procedures

As noted above, the Lahontan Regional Board sets priorities for Basin Plan revisions as part of its Triennial Review process. The Regional Board may also initiate Basin Plan amendments at any time in response to other issues of concern. As more information becomes available about the water quality and beneficial uses of waters of the Lake Tahoe HU, the Regional Board may consider changes in water quality standards such as adoption of numerical objectives for tributary streams which do not currently have them. The control measures set forth in this Chapter have been determined to be the **minimum** needed to prevent further degradation of Lake Tahoe due to sediment and nutrient loading,

and to ensure eventual attainment of clarity and productivity standards. Additional controls on sediment and nutrient loading may need to be developed in the future to offset the impacts of unforeseen factors such as the mortality of forest trees due to drought-related stresses in the late 1980s and early 1990s. Additional control measures may also need to be developed to ensure attainment of the standards contained in the USEPA's National Toxics Rule. Any substantial future changes in provisions of the TRPA 208 Plan which have been incorporated into this Lahontan Basin Plan may trigger consideration of corresponding Basin Plan amendments.

Before they take effect, Basin Plan amendments adopted by the Regional Board must be approved by the State Board and the California Office of Administrative Law.